

1           ABSTRACT OF THE DISCLOSURE

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3           Laser lines at 635 nm or longer (ideally 647 nm) are pre-  
4           ferred for red, giving energy-efficient, bright, rapid-motion  
5           images with rich, full film-comparable colors. Green and blue  
6           lines are used too — and cyan retained for best color mixing,  
7           an extra light-power boost, and aid in speckle suppression.  
8           Speckle is suppressed through beam-path displacement — by  
9           deflecting the beam during projection, thereby avoiding both  
10          absorption and diffusion of the beam while preserving pseudo-  
11          collimation (noncrossing rays). The latter in turn is impor-  
12          tant to infinite sharpness. Path displacement is achieved by  
13          scanning the beam on the liquid-crystal valves (LCLVs), which  
14          also provides several enhancements — in energy efficiency,  
15          brightness, contrast, beam uniformity (by suppressing both  
16          laser-mode ripple and artifacts), and convenient beam-turning  
17          to transfer the beam between apparatus tiers. Preferably de-  
18          flection is performed by a mirror mounted on a galvanometer or  
19          motor for rotary oscillation; images are written incrementally  
20          on successive portions of the LCLV control stage (either opti-  
21          cal or electronic) while the laser "reading beam" is synchro-  
22          nized on the output stage. The beam is shaped, with very lit-  
23          tle energy loss to masking, into a shallow cross-section which  
24          is shifted on the viewing screen as well as the LCLVs. Beam-  
25          splitter/analyzer cubes are preferred over polarizing sheets.  
26          Spatial modulation provided by an LCLV and maintained by pseu-  
27          docollimation enables imaging on irregular projection media  
28          with portions at distinctly differing distances from the pro-  
29          jector — including domes, sculptures, monuments, buildings;  
30          waterfalls, sprays, fog, clouds, ice; scrims and other stage  
31          structures; trees and other foliage; land and rock surfaces;  
32          and even assemblages of living creatures including people.